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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,447	03/25/2004	Takeshi Kijima	119247	4853

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EXAMINER	
JOLLEY, KIRSTEN	
ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/808,447	KIJIMA ET AL.	
	Examiner	Art Unit	
	Kirsten C. Jolley	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) *7-10* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 11-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 18, 2008 has been entered.

Response to Arguments

2. The 35 USC 112, 2nd paragraph rejection set forth in the prior Office action has been withdrawn.

3. Applicant's arguments filed December 18, 2008 have been fully considered but they are not persuasive.

Applicant argues that both Figures 5 and 17 of Sanada illustrate the second rotational speeds, which is less than the first and third rotational speeds, as occurring for a shorter period of time than the first and third rotational speeds. While the Examiner acknowledges that Figures 5 and 17 illustrate a second period of time shorter than the first and third periods of time, it is the Examiner's position that the embodiments illustrated in Figures 5 and 17 are merely exemplary and not limiting. Sanada et al. teaches in col. 10, lines 39-44 and col. 11, lines 12-20 that the length of time of the standby rotation frequency (the claimed "second time") would be "determined based on the size of the wafer W, flow velocity per unit time of photoresist solution

R supplied through the supply nozzle 30, quantity of photoresist solution needed to obtain the desired film thickness, and so on." Thus Sanada et al. clearly teaches that the length of time would be determined based on a number of factors by one having ordinary skill in the art, and the embodiments illustrated in the Figures are exemplary times. Further, in col. 11, lines 21-30, Sanada et al. teaches that the standby rotational frequency (the claimed "second time") may consist of two separate lower speed steps - a first time period with a frequency of 0 rpm followed by a second time period with a frequency of 1000 rpm. Therefore it is the Examiner's position that it would have been obvious to one having ordinary skill in the art to have determined the optimum length of time of the standby rotational frequency through routine experimentation, including use of a longer length of time than the first rotational frequency, in the absence of a showing of unexpected results. It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). Alternatively, it is noted that the claims are now further alternatively rejected over the prior art of Lee et al. The prior art of Lee et al. is similarly directed to a spin coating process comprising second rotational steps at a lower speed (in both its background section and in the invention) where the length of time of the lower rotational speed is significantly longer than the first speed.

Applicant further argues that the limitations of new claim 19 are not taught by Nakagawa. The Examiner notes that the prior art of Matsuyama et al. is cited to reject this claim, as discussed in the rejection below.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3, 5-6, 11-12, and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. (US 5,116,643) in view of Sanada et al. (US 5,989,632) alone, or further in view of Lee et al. (US 6,890,595).

Miller et al. is directed to a method of preparing a sol-gel and application of the sol-gel by spin coating to form a PLZT perovskite complex oxide ceramic film. Miller et al. also discloses that the substrate may have a platinum electrode thereon (col. 11, lines 50-54). Miller et al. generally discloses use of spin techniques to apply the film. Sanada et al. discloses an improved method of applying coatings to semiconductor substrates, including ceramic silica coatings, having high efficiency/low consumption of coating solution since the occurrence of fingers is minimized. Sanada et al.'s method includes use of a second low speed rotation step to accomplish this. It would have been obvious to one having ordinary skill in the art to have used the specific spin coating method of Sanada et al., including a second low speed rotation step, in the sol-gel ceramic complex oxide application method of Miller et al. in order to reduce consumption of the ceramic coating solution with the expectation of successful results since Sanada et al. is not limited as to the types of coating materials which may be used and specifically teaches use of another ceramic coating material.

With respect to the newly added limitation requiring "the second time being longer than the first time," it is noted that Sanada et al. teaches in col. 10, lines 39-44 and col. 11, lines 12-20 that the length of time of the standby rotation frequency (the claimed "second time") would be "determined based on the size of the wafer W, flow velocity per unit time of photoresist solution R supplied through the supply nozzle 30, quantity of photoresist solution needed to obtain the desired film thickness, and so on." Thus the lengths of time illustrated in Figures 5 and 17 are merely exemplary and not limiting, and Sanada et al. clearly teaches that the length of time would be determined based on a number of factors by one having ordinary skill in the art. Further, in col. 11, lines 21-30, Sanada et al. teaches that the standby rotational frequency (the claimed "second time") may consist of two separate lower speed steps - a first time period with a frequency of 0 rpm followed by a second time period with a frequency of 1000 rpm. Therefore it is the Examiner's position that it would have been obvious to one having ordinary skill in the art to have determined the optimum length of time of the standby rotational frequency through routine experimentation, including use of a longer length of time than the first rotational frequency, in the absence of a showing of unexpected results. It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Alternatively, Miller et al. and Sanada et al. are applied in view of Lee et al. In both its description of the prior art and its invention, Lee et al. discloses use of a second rotational step having a lower speed with a length of time significantly longer than the first higher speed. Thus Lee et al. demonstrates that it is conventional in the spin coating art to use a second, lower rotation, where the length of time of the second, lower speed is longer than the first time, as

claimed. It would have been obvious to one having ordinary skill in the art to have performed the lower, standby rotational step of Sanada et al. for a length of time that is longer than the length of time of the first, higher rotational speed with the expectation of successful results, particularly since Lee et al. discloses better uniformity with such a process.

As to claim 3, Sanada et al. is silent with respect to a step of drying the coating film after application by spin coating. The last rotational step of Sanada et al.'s method completes spreading of the coating material over the entire surface of the substrate. It is well known in the spin coating art, particularly the art of applying SOG coatings, to dry the applied coating film after application to evaporate the solvents/liquids therein. It would have been obvious to have included a step of drying the coating film after application in the method of Sanada et al. with the expectation of successful results since dry coated films are the end product.

As to new claim 11, Figure 17 of Sanada et al. illustrates that the first time is shorter than the third time.

As to new claims 12 and 15-18, the ceramic material of Miller et al. includes Ti, Zr, La, and Pb, and includes a PZT, and is directed to manufacturing a ferroelectric memory on semiconductor wafers (col. 1 and col. 11, lines 50-54).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. in view of Sanada et al. alone or further in view of Lee et al., as applied to claim 3 above, and further in view of Nakagawa (US 6,777,350).

Miller et al. in view of Sanada et al. lacks a teaching of drying the coating film by blowing gas onto the coating film. Nakagawa is directed to a process of applying a coating film

by spin coating, similar to Sanada et al. Nakagawa teaches that if air or nitrogen gas is blown on the wafer while rotating, the drying time is 2-3 times faster than for the conventional spin-drying technique. It would have been obvious, upon seeing Nakagawa, to have incorporated a step of blowing air or nitrogen gas on the coating film in the process of Miller et al. in view of Sanada et al. in order to significantly speed up drying of its coating film by 2-3 times.

7. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. in view of Sanada et al. alone, or further in view of Lee et al., as applied to claim 1 above, and further in view of WO 03/023858.

Natori et al. (US 2003/0227803) is cited as an English translation of WO 03/023858.

Miller et al. lacks a teaching of the coating material comprising Si or Ge. WO '858 is cited for its teaching of including Si or Ge paraelectric phase in a PLZT thin films (paragraphs [0035]-[0040]). It would have been obvious, upon seeing the prior art of Miller et al. and Sanada et al. in combination with WO '858 to have added a paraelectric phase including Si or Ge in the ferroelectric PLZT thin film of Miller et al. in view of Sanada et al. with the expectation of preventing the occurrence of 90° domains and obtaining hysteresis having good squareness.

8. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. (US 5,116,643) in view of Sanada et al. (US 5,989,632) alone or in view of Lee et al. (US 6,890,595), and further in view of Matsuyama et al.

Claim 19 is rejected for the same reasons discussed above in section 5 with respect to claim 1. Miller et al. in view of Sanada et al. lacks a teaching of blowing gas onto the coating at

a first temperature while heating the substrate on a hot plate at a second temperature, the first temperature being lower than the second temperature. Matsuyama et al. discloses a conventional drying and heat treatment apparatus comprising both the use of blowing nitrogen onto the coating material while also heating the substrate on a heating plate (col. 6, line 40 to col. 7). The temperature of the heating plate is higher than the temperature of the nitrogen gas. It would have been obvious to one having ordinary skill in the art to have used the conventional heat treatment apparatus of Matsuyama et al. to dry and heat the coating material applied in the process of Miller et al. in view of Sanada et al. with the expectation of successful results since Miller et al. is not limited to a particular heat treatment apparatus and since it would be desirable to eliminate oxidation of the coating in Miller et al. and Matsuyama et al. discloses an apparatus capable of such.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shibata (US 2004/0166237) is similarly cited for its teaching of a second lower rotational step, which is has a length of time longer than the first time (see Figure 1).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten C. Jolley whose telephone number is 571-272-1421. The examiner can normally be reached on Monday to Tuesday and Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kirsten C Jolley/
Primary Examiner, Art Unit 1792

kcj